

NON-PUBLIC?: N  
ACCESSION #: 9312300040  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: OYSTER CREEK, UNIT 1 PAGE: 1 OF 6

DOCKET NUMBER: 05000219

TITLE: TECHNICAL SPECIFICATION REQUIRED SHUTDOWN BECAUSE OF  
LOSS

OF POWER TO SAFETY RELATED SWITCHGEAR DUE TO GROUNDED  
SUPPLY CABLE

EVENT DATE: 04/21/90 LER #: 90-005-01 REPORT DATE: 12/17/93

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: POWER LEVEL:

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:

50.73(a)(2)(i)

LICENSEE CONTACT FOR THIS LER:

NAME: BRENDA DEMERCHANT, TELEPHONE: (609) 971-4642  
SENIOR LICENSING ENGINEER

COMPONENT FAILURE DESCRIPTION:

CAUSE: B SYSTEM: EB COMPONENT: CBL5 MANUFACTURER: A385  
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On April 21, 1990 at 0955 hours, power was lost to Unit Substation (USS) 1B2 when a power supply cable shorted to ground. Several safety related components were affected by the loss of power. and drywell unidentified leak rate increased to greater than 5 gpm due to loss of power to the Drywell Equipment Drain Tank Pump Control Circuit. The plant was shutdown due to loss-of-power to required electrical busses, and on April 22nd at 1005 hours, the reactor reached cold shutdown. USS 1B2 was isolated from the failed supply cable and reenergized from USS 1A2 via the crossconnect breaker. During the cooldown, the A isolation condenser was declared inoperable due to the inability to electrically cycle a DC isolation valve because of thermal binding. This thermal binding problem was corrected by modifications completed during the 13R refueling outage.

The cause of the cable failure was determined to be a 'void' in the insulation of the cable. A new supply cable was installed and the USS was repowered from its normal source. A representative sample of other cables supplying safety related components were tested, and no generic concerns were found. On March 22, 1991, the 1A2 cable failed during the 13R outage. There appears to be no connection between the failures of these two cables.

END OF ABSTRACT

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DATE OF OCCURRENCE

The event described within this report occurred on April 21, 1990.

IDENTIFICATION OF OCCURRENCE

A loss of electrical power was experienced on Unit Substation 1B2 (EIIC-USS) after the "C" phase supply cable (EIIC-CBL5) shorted to ground. Power was also lost to various pieces of safety related equipment. Due to loss-of-power to the control circuit for the Drywell Equipment Drain Tank (DWEDT) pumps (EIIS-WK), the DWEDT overflowed to the drywell sump and resulted in an increase in unidentified leak rate to greater than 5 gallons per minute. A reactor shutdown was commenced due to loss-of-power to Technical Specification required switchgear, and approximately 24 hours after the loss-of-power, the reactor reached cold shutdown conditions. This occurrence is considered reportable under 10CFR50.73(a)(2)(i)(A) and 10CFR50.73(a)(2)(iv).

CONDITIONS PRIOR TO OCCURRENCE

The reactor was at 100% power, with a generator load of approximately 647 megawatts electric.

DESCRIPTION OF OCCURRENCE

On April 21, 1990 at 0955 hours, power was lost to Unit Substation (USS) 1B2. Investigation showed that the supply breaker to the Unit 4. Substation opened due to a short circuit to ground which developed in the "C" phase of the power supply cable to the Unit Substation. When power was lost to the USS, several motor control centers (EIIC-MCC) also lost power as well as the safety related equipment powered from the USS. The battery chargers (EIIC-BYC) for the B Train of the Vital 125VDC Distribution System (EIIS-EJ) were deenergized during this event, causing the battery (EIIC-BTRY) to carry the load of the system. The loss of

power to required busses and motor control centers required that the plant be in a cold shutdown condition within 30 hours. Other safety related systems and components declared inoperable due to the loss-of-power included; Containment Spray System 2 (EIIIS-BE), due to loss of power to the pumps, Isolation Condenser B (EIIIS-BL), due to loss of power to the AC valves in the system, the B Control Rod Drive pump (EIIIS-AA), the B Standby Liquid Control pump (EIIIS-BR), and the B train of the Standby Gas Treatment System (EIIIS-BH). Several detection panels in the site Fire

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#### DESCRIPTION OF OCCURRENCE (Cont'd)

Protection System (EIIIS-IC) were also deenergized and continuous roving fire watches were established to monitor all areas of the plant. The Core Spray Systems I and II (EIIIS-BM) were placed in a degraded condition due to a loss of redundancy resulting from an inoperable booster pump in each system. In addition, the Post Accident Sampling System was deenergized due to this event.

The control circuit for the Drywell Equipment Drain Tank pumps also lost power, which caused this tank to overflow resulting in an unidentified leak rate greater than 5 gpm. This leak rate required that the plant be shutdown within 12 hours and be in cold shutdown within 24 hours.

Because the battery for the B Train of the Vital 125VDC Distribution System was carrying the load of the system, voltage on the battery dropped throughout the event and, after 11 hours, concern for the remaining battery capacity resulted in a decision to manually scram the reactor. The reactor was scrammed at 2014 hours and plant cooldown was commenced. At 2350 hours the A Isolation Condenser was declared inoperable due to the inability to electrically cycle one of the DC isolation valves (EIIIC-ISV) because of thermal binding.

On April 22, 1990 at 0820 hours, USS 1B2 was isolated from the failed supply cables and reenergized from USS 1A2 via the 480VAC Electrical Distribution System (EIIIS-ED) crossconnect breaker. The loads lost when USS 1B2 was deenergized were recovered satisfactorily. At 1005 hours the reactor was placed in a cold shutdown condition. In addition to the Reactor Protection System (EIIIS-JC), a partial primary containment isolation was experienced when instrument panel CIP-3 was transferred to its alternate source of power. No other safety systems were initiated during this event. On March 22, 1991, the 1A2 cable failed during the

13R outage. This cable is original G.E. cable of a different design than the 1B2 cable. Testing of the circuit determined that there was no connection between the failure of the two cables.

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#### APPARENT CAUSE OF OCCURRENCE

The cause of the cable failure was determined to be a 'void' in the insulation of the cable. It has been determined that no damage occurred during installation. Extensive cable testing was conducted on sections of the faulted cable phases along the length of the circuit. The specific fault location was melted by the arc of the fault as always in faulted cable sections. An anomaly was observed where water had entered the jacket of two cable phases at one or two small local areas but was not absorbed into the primary cable insulation at the time of the failure. Although this observance was postulated as a possible root cause for the event by the cable laboratory, further review and analysis of the original factory test reports indicated that water absorption was not a credible or likely root cause for the fault. The factory reports suggest that there were small voids in the primary insulation of one of the circuits three phases which did not preclude the cable from meeting all factory and industry standards for cable manufacture. The cable laboratory test results show one additional apparent void site in close proximity to the fault location. The most probable root cause for this failure has been determined to be the accelerated corona attack of a local area of the cable where a small void existed in the primary cable insulation.

#### ANALYSIS OF OCCURRENCE AND SAFETY SIGNIFICANCE

This event has been determined to have minimal safety significance. All of the systems affected by the loss-of-power, with the exception of the Isolation Condenser System, had redundant systems powered from the other train of the 480VAC Electrical Distribution system. All distribution panels powered from the 1B2 bus that were required to automatically seek alternate sources of power, transferred to their alternate sources as designed.

If required, the B isolation condenser could still have performed its function. Power was lost to the AC powered valves in the system, however the DC powered valves were powered by a DC source not affected by the loss-of-power. These DC valves could have been used to operate the condenser if required. Additionally, the valves on both isolation condensers could have been operated manually.

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#### ANALYSIS OF OCCURRENCE AND SAFETY SIGNIFICANCE (Cont'd)

The ability to shutdown the plant and reach cold shutdown was not affected by the loss-of-power. Because the reactor was operating at approximately 100% power, and due to the design of redundant components in the affected systems, this event would not have been any more significant at any other power level or in any other plant operating mode.

#### CORRECTIVE ACTION

The supply cables for Unit Substation 1B2 were disconnected from the transformer for the USS. The switchgear was inspected and tested to ensure that the fault in the cable had not damaged any electrical equipment or the switchgear itself. USS 1B2 was then crossconnected to the other Train in the Electrical Distribution System and reenergized.

A new supply cable was installed and the USS was repowered from its normal source. The faulty cable was visually inspected. A representative sample of other cables supplying safety related equipment were tested for similar problems. No generic concerns were found. A routine testing program for cables and equipment was instituted during the 13R refueling outage.

It has been observed that cable factory test results fully meeting both factory and industry standards for corona extinction and initiation levels may still suffer early failures. All newly procured 5KV shielded power cable will be specified to corona levels shown in previous GPUN cable testing to provide normal cable service life. Corona extinction levels below 7.0KV AC appear to be where problems in service life have appeared and above this level no problems were observed.

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#### CORRECTIVE ACTION (Cont'd)

Standing water present in the basement conduit system was cleared to avoid any reoccurrence of the peripheral laboratory finding of water migration through jacket materials.

A review of shipping paperwork and factory reports did not identify any additional cable of this type installed with corona levels below expected good service levels. Also tested during the 13R refueling outage were

non-safety related circuits using the Anaconda cable and additional circuits which have the original plant General Electric 5KV cable installed.

Modifications to the Isolation Condenser System were completed during the 13R outage which included replacement of the valves experiencing thermal binding.

#### SIMILAR EVENTS

LER 83-021 Loss of Bus 1A and Stack Gas Sampling Out of Service

LER 88-022 Actuation of ESF Due to Loss of "1D" Electrical Bus Caused by Cable Fault

#### EQUIPMENT DATA

The failed cable was supplied by Anaconda. The type of cable is: Shielded, 5000 Volt 1/C, 500 MCM, Copper, Unshield Cable.

ATTACHMENT TO 9312300040 PAGE 1 OF 1

GPU Nuclear Corporation  
Post Office Box 388  
GPU Nuclear Route 9 South  
Forked River, New Jersey 08731-0388  
609 971-4000  
Writer's Direct Dial Number:

C321-93-2362  
December 17, 1993

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555

Dear Sir:

Subject: Oyster Creek Nuclear Generating Station  
Docket No. 50-219  
Licensee Event Report Revision

This letter forwards one (1) copy of Licensee Event Report (LER) No. 90-005, Revision 1. A bar has been placed in the right side margin to indicate the revised wording.

If you should have any questions, please contact Brenda DeMerchant, OC  
Licensing Engineer at 609-971-4642.

Very truly yours,

J. J. Barton  
Vice President and Director  
Oyster Creek

Enclosure  
JJB/BDEM:jc

cc: Administrator, Region 1  
Senior NRC Resident Inspector  
Oyster Creek NRC Project Manager

GPU Nuclear Corporation is a subsidiary of  
General Public Utilities Corporation

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